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(71) Applicant(s)

R.J. Designrights Limited

(Incorporated in the United Kingdom)

**P.O. Box 76, Weybridge, SURREY, KT13 8XR,
United Kingdom**

(72) Inventor(s)

Robert Jankel

(74) Agent and/or Address for Service

Marks & Clerk

**57-60 Lincoln's Inn Fields, LONDON, WC2A 3LS,
United Kingdom**

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(58) Field of Search

UK CL (Edition O) B7B BCHA BCM

INT CL⁶ B62D 29/00 29/04

(54) **Motor vehicle manufactured from modular plastics panels**

(57) A motor vehicle 26 is constructed from a number of foam filled metal reinforced plastics modular panels, including the base panel 2 and body panels 4-12.

Other features include self contained removable light units 70,72 mounted behind transparent panels 14,24 of the body shell to reduce drag, longitudinally adjustable steering wheel 74 and foot pedal assembly 76, and an airbag 86 mounted within the body shell for inflation externally to the vehicle. Advantages include low tooling and manufacturing costs, and a vehicle which is recyclable and resistant to rust.

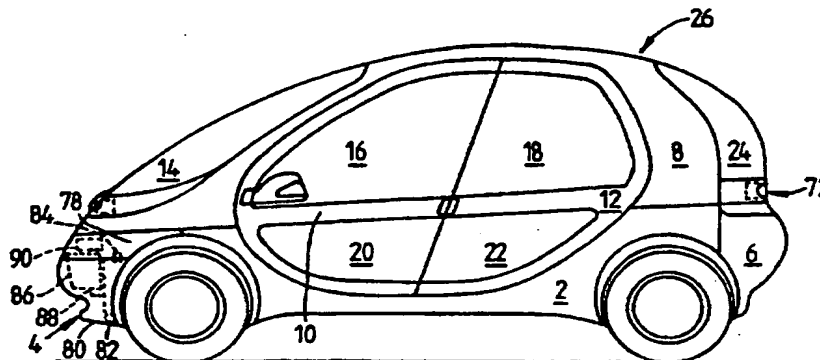


FIG. 12

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

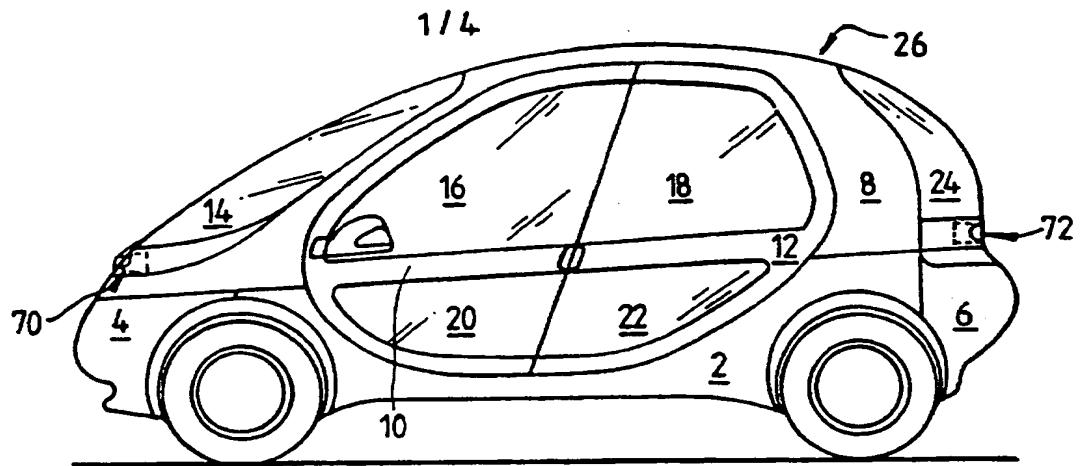


FIG. 1

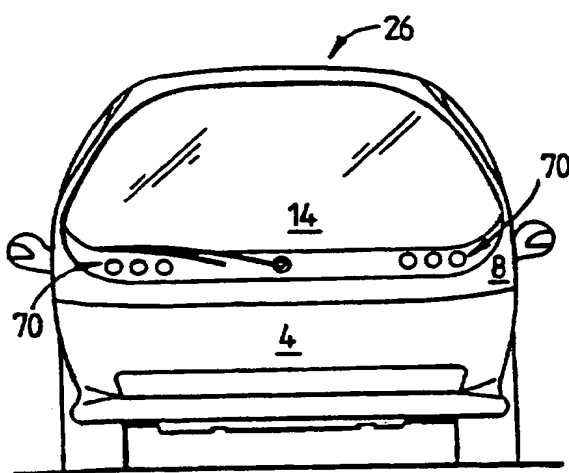


FIG. 2

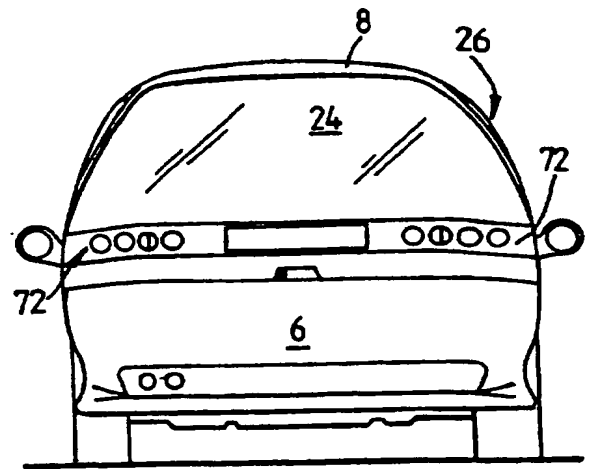


FIG. 3

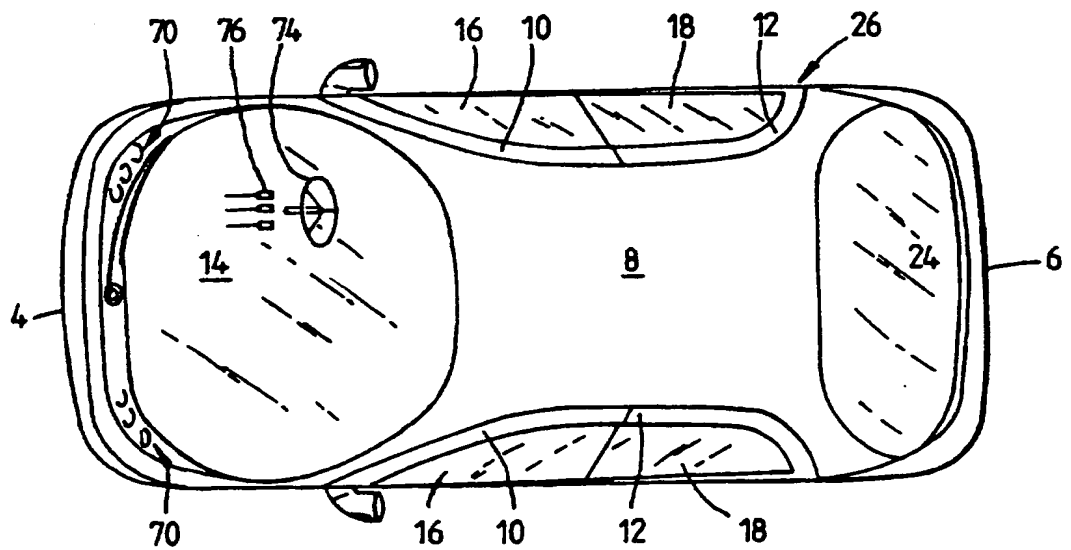


FIG. 4

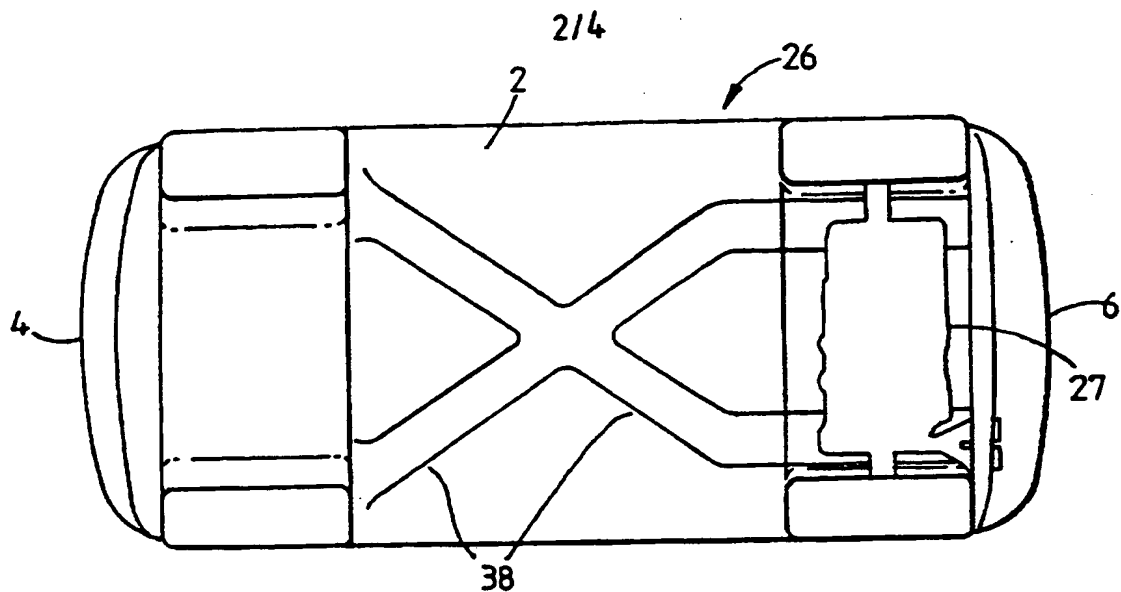


FIG. 5

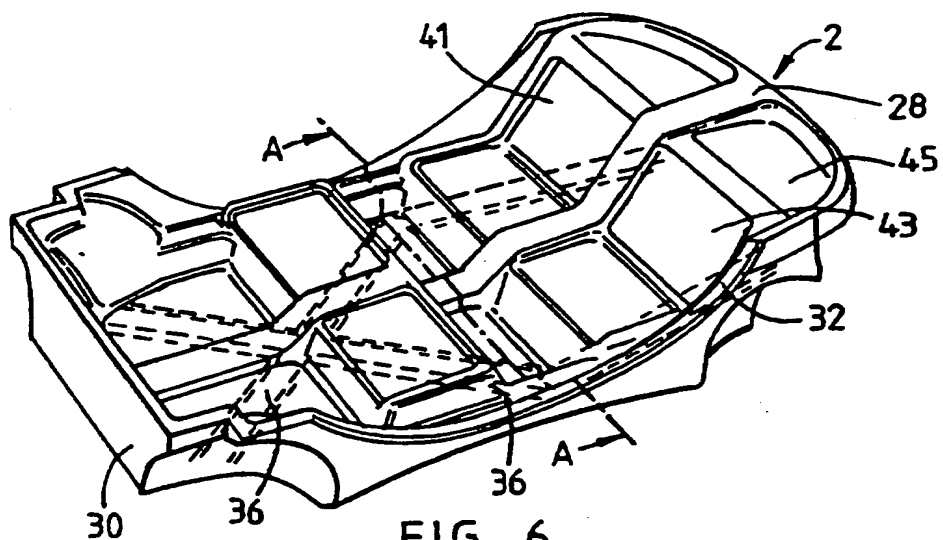


FIG. 6

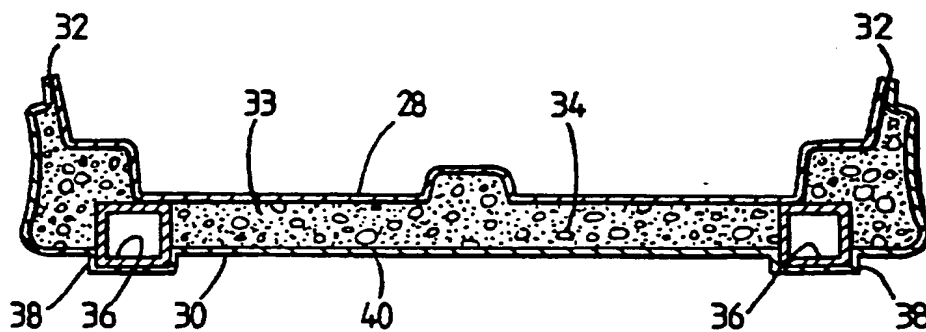


FIG. 7

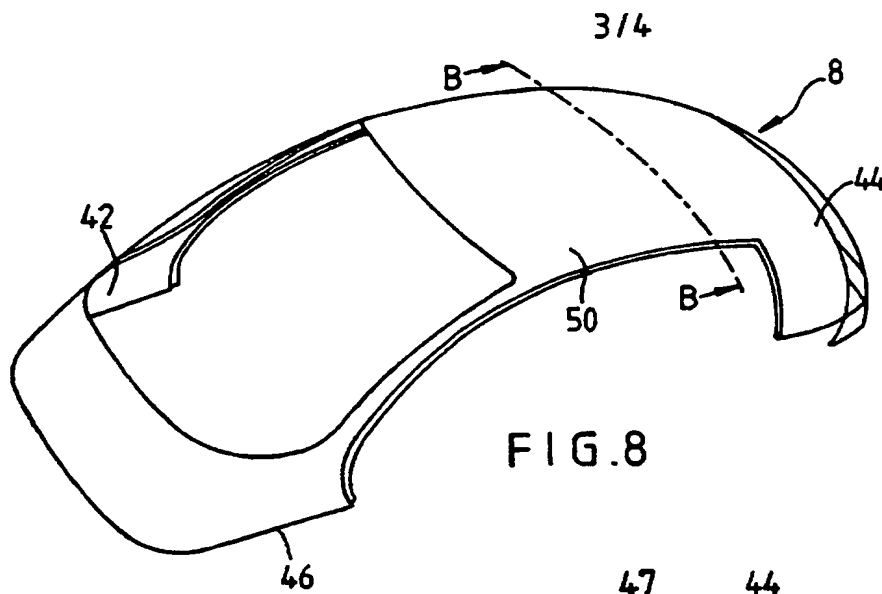


FIG. 8

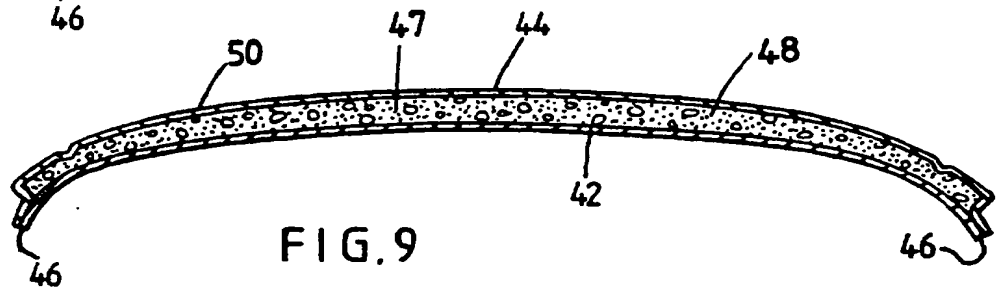


FIG. 9

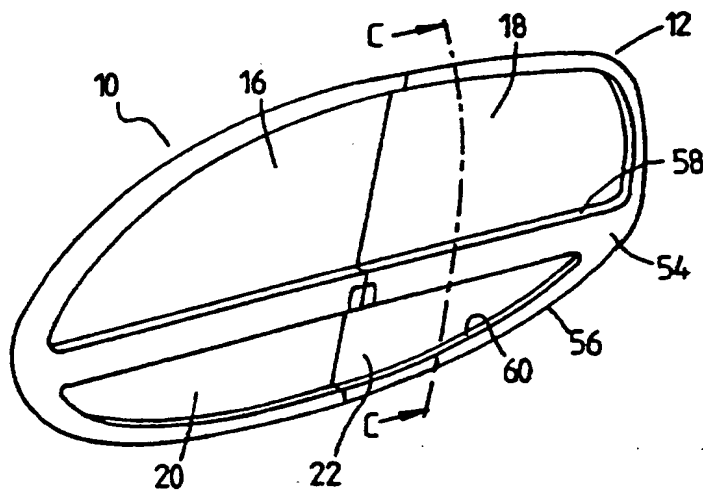


FIG. 10

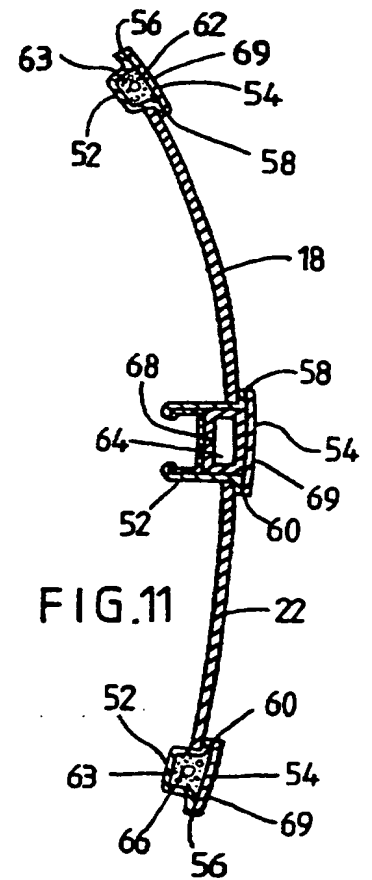


FIG. 11

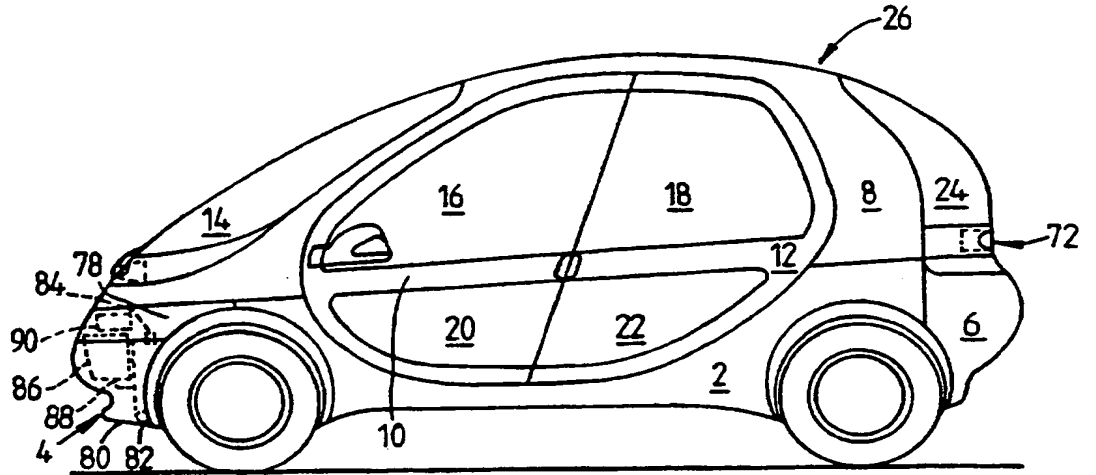


FIG. 12

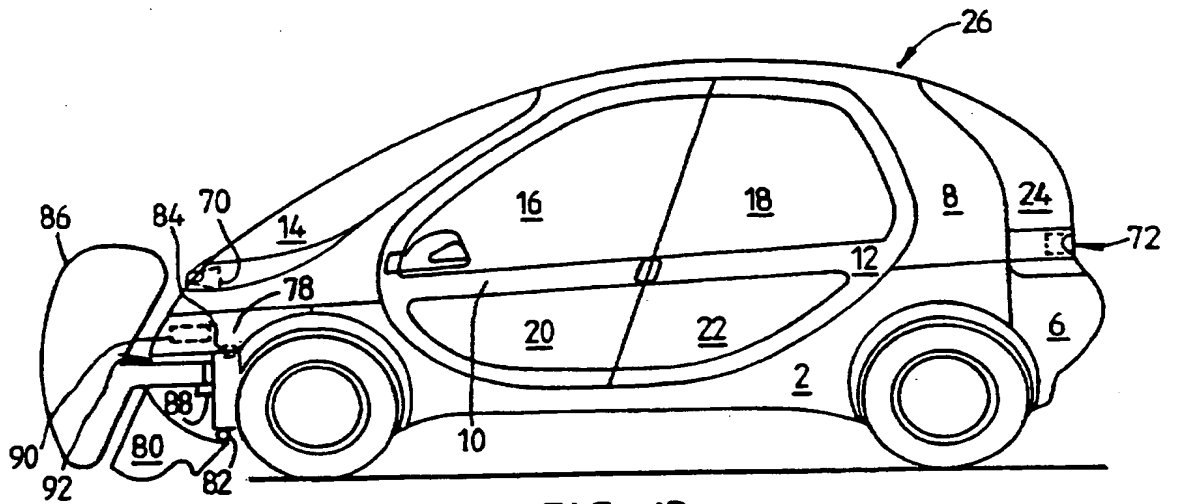


FIG. 13

Motor Vehicle and Method of Manufacture Thereof

The invention relates to a motor vehicle and to a method of construction thereof, particularly but not exclusively to mass-produced motor vehicles.

It is well known that the base panel and body panels of a typically mass-produced motor vehicle are each constructed from numerous metallic components which are welded or bolted together to form a single unit. However, both the large number of components manufactured and the metallic materials used give rise to a number of problems.

The mass-production of components made from any material is preceded by a process of "tooling-up". One problem encountered in the automotive industry is undesirably high "tooling-up" costs which can be attributed, at least in part, to the large number of individual components manufactured and the expensive metal pressing equipment used.

A further problem associated with conventional base panels and body panels is that they are commonly made from steel which is prone to rusting and difficult to recycle effectively.

Although some manufacturers of motor vehicles use metals which are resistant to rust, such as aluminium, these metals are very expensive and are generally only used

where a motor vehicle is to be marketed as an expensive "prestige" vehicle or where a resistance to rust corrosion is regarded as essential by the intended motor vehicle user.

The problem of corroding body panels has, in some instances, been overcome by using alternative materials to metal. Fibreglass has been used for many years to make body panels for a variety of motor vehicles. However, although fibreglass is strong, light and resistant to rust corrosion, it is a brittle material and easily damaged by point loads. Furthermore, the process by which fibreglass is manufactured is not suitable for large volume mass-production.

It is also known that motor vehicles generally have external light units mounted on, or substantially flush with, the exterior surface of their body shell. Light units of this nature are generally mounted on motor vehicles so that their integral lenses form part of the exterior surface of the motor vehicle. The light units are therefore exposed to ambient weather conditions and, consequently, must be constructed so as to prevent the ingress of water. This inevitably increases the cost of the light unit.

A further problem associated with the external light units of motor vehicles concerns their contribution to drag. In order to reduce drag, many manufacturers of motor vehicles ensure that the exposed surface of each light unit is substantially flush with the surrounding exterior surface of the motor vehicle. However, inevitable gaps between the light units and the surrounding exterior surface break the continuity of the exterior surface of a motor vehicle and, consequently, prevent motor vehicle drag from being reduced to a minimum.

It is also known that bumpers are frequently located on the front and rear of motor vehicles. The purpose of such bumpers is to provide a motor vehicle body shell

with some degree of protection against damage arising from an impact or crash with an extrinsic object, such as a wall or another motor vehicle. Until relatively recently, the bumpers of many motor vehicles comprised a robust metallic beam. However, such bumpers are often unattractive to the eye and produce undesirable drag. In order to improve the aesthetic and aerodynamic characteristics of motor vehicle body shells, many modern motor vehicles are now designed with bumpers which form an integral part of the body shell. However, these bumpers are easily damaged and provide the user of the motor vehicle with very little protection in the event of a crash.

It is an object of the present invention to provide a motor vehicle constructed so as to reduce manufacturing costs.

It is also an object of the present invention to provide a motor vehicle comprising a base panel and body panels constructed so as to be resistant to rust corrosion and substantially recyclable.

It is a further object of the present invention to provide a motor vehicle comprising light units arranged so as to minimise drag and reduce costs.

It is a further object of the present invention to provide a motor vehicle comprising means for protecting the front, sides and rear of the motor vehicle body shell from damage without compromising the aesthetic or aerodynamic characteristics of the motor vehicle body shell.

It is a further object of the present invention to provide a motor vehicle comprising means for reducing the forces exerted on the motor vehicle user in the event of a crash without compromising the aesthetic or aerodynamic characteristics of the motor vehicle body shell.

The invention provides a motor vehicle as set out in claim 1. Further and advantageous features are set out in subsidiary claims 2 to 13.

The invention further provides a motor vehicle as set out in claim 14. Further and advantageous features are set out in subsidiary claims 15 to 17.

The invention further provides a motor vehicle as set out in claim 18. Further and advantageous features are set out in subsidiary claims 19 to 28.

The invention further provides a method of manufacturing a motor vehicle as set out in claim 31. Further and advantageous features of manufacturing a motor vehicle are set out in subsidiary claims 32 to 38.

The invention further provides a method of manufacturing a motor vehicle as set out in claim 39.

The present invention has a number of advantages over the relevant prior art. One significant advantage relates to the "tooling-up" costs involved with the mass-production of motor vehicles. Firstly, the base panel and body panels of the present invention comprise only a very small number of components. Secondly, the method of manufacturing the base panel and body panels reduces the number of exterior and interior trim components required. Conventional metal motor vehicles comprise a large number of plastic trim components which are used for aesthetic purposes. However, the present invention effectively provides the base panel and body panels with integrally moulded interior and exterior trim components. Thus, the associated "tooling-up" costs are very low in comparison with those for conventional motor vehicles, potentially as low as ten or twenty percent. Manufacturing costs are also reduced.

The present invention also provides a motor vehicle with a base panel and body panels which are of plastics material and therefore resistant to rust corrosion and substantially recyclable. Furthermore, the present invention provides a motor vehicle with a base panel and body panels reinforced with metallic bracing members which are protected from exposure to water and rust corrosion.

A further advantage of the invention results from the mounting arrangement of the motor vehicle light units which effectively reduces the drag associated with such light units to zero. Furthermore, the mounting arrangement removes the need to make the light units impermeable to water and therefore reduces the cost of their manufacture. The mounting arrangement of the light units within the interior of the body shell also affords the light units greater protection from damage than a conventional arrangement. A further advantage is that the light units may be easily adjusted or removed from within the interior of the body shell.

Further advantages of the present invention can be attributed to the airbag stored within the motor vehicle body shell. The airbag effectively extends the crumple zone of the motor vehicle prior to a crash and therefore improves the safety characteristics of the motor vehicle. Furthermore, the airbag does not compromise the aesthetic or aerodynamic characteristics of the motor vehicle body shell.

An embodiment of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a side view of a motor vehicle according to the invention;

Figure 2 and Figure 3 are front and rear views respectively of the motor vehicle of Figure 1;

Figure 4 is a plan view of the motor vehicle of Figure 1;

Figure 5 is an underneath view of the motor vehicle of Figure 1;

Figure 6 is a perspective view of the base panel of the motor vehicle of Figure 1;

Figure 7 is a cross-sectional view of the base panel of Figure 6 taken along the line A - A;

Figure 8 is a perspective view of the body shell roof and side walls of the motor vehicle of Figure 1;

Figure 9 is a cross-sectional view of the body shell roof and side walls of Figure 8 taken along the line B - B;

Figure 10 is a perspective view of the side door of the motor vehicle of Figure 1;

Figure 11 is a cross-sectional view of the side door of Figure 10 taken along the line C - C;

Figure 12 is a side view of the motor vehicle of Figure 1 showing the airbag of the motor vehicle in a stored position; and

Figure 13 is a side view of the motor vehicle of Figure 1 showing the airbag of the motor vehicle in an inflated position.

The embodiment of the present invention shown in Figures 1 to 5 comprises a rigidised under-structure or base panel 2, a plurality of body panels 4 to 12, and a plurality of transparent panels 14 to 24. The components 2 to 24 collectively comprise a body shell of a motor vehicle 26.

The base panel 2 is the principal load bearing component of the motor vehicle 26. It is upon the base panel 2 that the body panels 4 to 12 are mounted. Other major

components of the motor vehicle 26, such as an engine 27 (see Figure 5), wheels and suspension components (not shown), are also mounted on the base panel 2.

The interior surfaces of the base panel 2, the body panels 4 to 12 and the transparent panels 14 to 24 provide a completely enclosed interior space for the user of the motor vehicle 26, whilst the exterior surfaces of these panels provide a body shell designed to minimise drag. The rigidised upper-structure or body panel 8 defines the body shell roof and side walls. The body panel 8 and the base panel 2 (rigidised upper-structure and rigidised under-structure respectively) form a rigidised monocoque structure when attached to one another. Body panels 4,6 provide front and rear bumpers respectively. Body panels 10,12 define front and rear side doors respectively and allow access to the front and rear of the interior space.

Figure 4 shows that body panels 10,12 are provided on both sides of the motor vehicle 26. An alternative number of side doors may be provided as appropriate. For example, in small motor vehicles it may only be necessary to provide two side doors, however in large motor vehicles it may be more appropriate to provide six or more side doors. The body panels 10,12 are constructed so as to define a frame in which transparent panels 16 to 22 are mounted to form side windows. Transparent panel 14 defines a front window (or windscreen) and transparent panel 24 defines a rear window. Both transparent panels 14,24 are mounted within a frame defined by the body panel 8.

Figure 6 shows a perspective view of the base panel 2 and Figure 7 shows a cross-sectional view of the base panel 2. Figure 7 illustrates the construction of the base panel 2 which comprises an inner skin 28 and an outer skin 30. Both inner skin 28 and outer skin 30 are made from a suitable plastics material. For example, the inner skin 28

may be made from Bayblend PC (Polycarbonate)/ABS (Acrylonitrile-butadiene-styrene) or Novodur ABS, depending upon relevant thermal and impact requirements, and the outer skin 30 may be made from Pocan PC/PBT (Poly(1,4-butylene terephthalate))-Blend. Each skin may be manufactured using well know production methods such as injection moulding.

The inner skin 28 and outer skin 30 are joined together using plastic welding techniques, adhesives or other suitable attachment means to provide a seal 32. The inner skin 28 and outer skin 30 are designed so that when they are located adjacent one another, as illustrated in Figure 7, the seal 32 forms a substantially unbroken ring. Consequently, the location of inner skin 28 adjacent outer skin 30 provides an enclosed cavity 33. The cavity 33 bounded by the inner skin 28 and the outer skin 30 is filled with a reinforcement filling 34 which is made from a suitable plastics material such as foamed polyurethane. The reinforcement filling 34 generally supports and improves the rigidity of the base panel 2. Further reinforcement and torsional rigidity is provided by the inclusion of bracing members 36 within the cavity 33 bounded by inner skin 28 and outer skin 30. The bracing members 36 are located in channels 38 formed in the outer skin 30 and are arranged so as to abut the inner skin 28. The bracing members 36 are constructed from aluminium or any other suitable material. The inclusion of the bracing members 36 is not essential but dependent upon the torsional stiffness requirements of the base panel 2.

The exposed surface of the outer skin 30 is coated with a thin film 40 which provides the base panel 2 with a chosen colour or texture. The film 40 is made of PC or PBT or any other suitable material. The inner skin 28 is moulded with integral seats or

parts of seats 41,43 and an integral rear parcel shelf 45. Other integrally moulded interior cabin features may be provided as required. Furthermore, as the inner skin 28 can be seen by the user of the motor vehicle 26, the exposed surface of the inner skin 28 may be moulded with an attractive textured or patterned finish.

Figure 4 shows a steering wheel assembly 74 and a foot pedal assembly 76 which provide the principal controls for the motor vehicle 26. The steering wheel assembly 74 and the foot pedal assembly 76 are mounted within the interior of the motor vehicle 26 so as to be movable in a direction parallel to the longitudinal axis of the motor vehicle 26. This mounting arrangement allows the steering wheel assembly 74 and the foot pedal assembly 76 to be located in various fore and aft positions. A suitable locking mechanism is also provided to retain the respective control assembly in a chosen position. Thus, although the motor vehicle 26 comprises integrally moulded seats which cannot be moved between fore and aft positions, it is possible for motor vehicle operators of various heights to adjust the steering wheel assembly 74 and the foot pedal assembly 76 in order to obtain an appropriately ergonomic arrangement of controls.

Figures 8 and 9 illustrate the construction of the body panel 8. The construction of the body panel 8 is similar to that of the base panel 2. The body panel 8 comprises an inner skin 42 and an outer skin 44 which are joined together at their periphery 46 in a similar manner to that in which the inner skin 28 and the outer skin 30 of the base panel 2 are joined. A cavity 47 is defined by the inner skin 42 and the outer skin 44 and is filled with a reinforcement filling 48. The reinforcement filling 48 is made from an identical or similar material to that used for the reinforcement filling 34 of the base

panel 2. Bracing members providing further reinforcement may be included within the inner skin 42 and the outer skin 44 but are not present in the current embodiment.

A thin film 50 covers the exposed surface of the outer skin 44. The film 50 provides the exposed surface of the outer skin 44 with a chosen colour in a similar manner to the film 40 of the outer skin 30. The film 50 is also made of the same or similar material as the film 40.

The inner skin 42 can be seen by the user of the motor vehicle 26. Consequently, the exposed surface of the inner skin 42 may be moulded with an attractive textured or patterned finish.

The body panels 4,6 are constructed in the same fashion as the body panel 8 and are removably attached to the base panel 2 using screws, bolts or other mechanical attachment means. Alternatively, the body panels 4,6 may be made integrally with the base panel 2.

Figures 10 and 11 illustrate the construction of the side door body panels 10,12. The side door body panels 10,12 are again constructed in a similar manner to the base panel 2 and the body panel 8 described above. Figure 11 illustrates a cross-sectional view of the side door body panel 12, and it is with reference to this body panel that the construction of both side door body panels 10,12 will be described.

The side door body panel 12 comprises an inner skin 52 and an outer skin 54 which are joined along the edges 56 to 60 in a similar manner to the joining of the inner skin 28 and the outer skin 30 of the base panel 2. A cavity is formed which may be considered in three portions: upper cavity portion 62, central cavity portion 64 and lower cavity portion 66. Both upper and lower cavity portions 62,66 are filled with a

reinforcement filling 63 made from a suitable plastics material as already discussed.

The central cavity portion 64 is occupied by a bracing member 68. The bracing member 68 is made of aluminium or any other suitable material.

A thin film 69 covers the exposed surface of the outer skin 54. The film 69 provides the exposed surface of the outer skin 54 with a chosen colour in a similar manner to the film 40 of the outer skin 30. The film 69 is also made of the same or similar material as the film 40. A chosen colour may be alternatively provided on the base panel 2 and the body panels 4 to 12 by applying paint.

The side door body panel 12 defines a frame in which the transparent panels 18,22 are mounted. The transparent panels 18,22 are made from glass or any other suitable transparent material using standard manufacturing techniques which will be known to the skilled reader. The side door body panel 10 is constructed in a similar manner to the body panel 12, and the transparent panels 16,20 are made in a similar manner to the transparent panels 18,22.

The transparent panels 14,24 are made in a similar manner to the transparent panels 16 to 22. The transparent panels 14,24 are mounted within the body panel 8 so as to completely cover the front and rear light units 70,72 respectively. The light units 70,72 are mounted wholly within the interior space of the body shell of the motor vehicle 26, preferably in the moulded dashboard and rear parcel shelf, and are thereby protected from ambient weather conditions and minor accidental damage.

The light units 70,72 abut the transparent panels 14,24 respectively but may equally be spaced apart from their respective transparent panels provided that the light emitted by them provides illumination external to the motor vehicle 26. The light units

70,72 are also mounted so as to allow their adjustment from within the interior of the body shell or to allow their removal. The light units 70,72 may also be designed as self-contained units incorporating their own power sources and switching mechanisms. In this way, the light units 70,72 may be individually removed from the motor vehicle 26 and operated in isolation from the motor vehicle 26 in a similar manner to a conventional torch or flash-light. The light units 70,72 may be alternatively mounted in a conventional manner.

Figure 12 shows means for protecting the motor vehicle 26 from impending impacts or crashes. The body panel 4 provides a front bumper for the motor vehicle 26 and comprises an upper front bumper panel 78 and a lower front bumper panel 80. The upper front bumper panel 78 is rigidly attached to the base panel 2. The lower front bumper panel 80 is attached to the base panel 2 by means of a hinge 82 and to the upper front bumper panel 78 by means of a locking device 84.

An airbag 86 is mounted on the base panel 2 and stored within the body shell of the motor vehicle 26 in close proximity to the inner skin of the body panel 4. The airbag 86 is stored in a deflated and folded state. An inflating device 88 is also mounted on the base panel 2. The inflating device 88 provides a suitable gas to the airbag 86 so as to deploy the airbag 86 into an inflated position (see Figure 13). The gas provided by the inflating device 88 is preferably a non-toxic gas such as air. The inflating device 88 may provide gas to the airbag 86 by allowing a compressed source of the gas to expand into the airbag 86. Alternatively, the inflating device 88 may generate the gas as a product of an explosive chemical reaction.

A sensor 90 provides means for determining the distance between the motor vehicle 26 and objects extrinsic to the motor vehicle 26 and provides further means for determining the velocity of the motor vehicle 26 relative to the said objects. The sensor 90 provides sufficient information for an impending impact or crash between the motor vehicle 26 and an extrinsic object to be anticipated. When the sensor 90 detects velocities and distances that satisfy pre-determined criteria, the airbag 86 is deployed into an inflated position which extends beyond the exterior surface of the body shell. The pre-determined criteria is such that the airbag 86 is only deployed when the distance between the motor vehicle 26 and an extrinsic object is small (perhaps no more than two meters) and the velocity of the motor vehicle 26 relative to the extrinsic object is high (perhaps not less than 15 km/h). The specific distance and velocity values selected will depend upon the design requirements of the motor vehicle 26.

Figure 13 shows the airbag 86 in a deployed position. Once deployment of the airbag 86 is initiated by the sensor 90, the locking device 84 is automatically released allowing the lower front bumper panel 80 to rotate about the hinge 82. Rotation of the lower front bumper panel 80 occurs by the action of gravity and by the action of the airbag 86. The rotation of the lower front bumper panel 80 provides an opening 92 through which the airbag 86 inflates so as to extend beyond the exterior surface of the body shell. The airbag 86 is inflated with a gas provided by the inflating device 88. Thus, prior to an impact of the body panel 4 with an extrinsic body, the airbag 86 is deployed providing protection for the body shell. The airbag 86 also extends the crumple zone of the motor vehicle 26, thus providing additional protection for the occupants of the motor vehicle 26.

The opening 92 may be provided by an alternative arrangement to that used in the present embodiment. For example, rather than providing the body panel 4 with a lower front bumper panel 80 which hinges downwardly, the body panel 4 may be arranged with flaps which open outwards from the body shell about vertical hinges.

As an extrinsic body impacts with the airbag 86, the gas with which the airbag 86 is filled is allowed to escape in a controlled manner through a release valve (not shown). The controlled escape of the gas allows the energy associated with the impact to be absorbed whilst minimising the rate of change of motor vehicle velocity. Energy is also absorbed through the expansion or stretching of the surface of the airbag 86. This surface stretching is caused by an increase in gas pressure within the airbag 86 which results from a decrease in the volume of the airbag 86 during an impact. Depending upon the nature of the impact anticipated by the sensor 90, the airbag 86 can be provided with additional gas so as to make the airbag 86 more capable of absorbing the high energy associated with a very major impact or crash.

Alternative embodiments of the present invention may provide a motor vehicle comprising airbags arranged at the front, sides and rear of the motor vehicle body shell.

A method of manufacture of the motor vehicle 26 will now be described.

The manufacture of the body panels 4 to 12 will be described with reference to the manufacture of the base panel 2. The inner skin 28 is made from Bayblend PC/ABS or Novodur ABS and the outer skin 30 is made from Pocan PC/PBT - Blend. Alternative plastics material may be used as appropriate. The inner skin 28 and the outer skin 30 are manufactured separately using plastic forming techniques such as

injection moulding. Alternative techniques to injection mounting may be used as appropriate.

The attachment of the film 40 to the outer skin 30 is made during the manufacture of the outer skin 30. When injection moulding is used, the mould of the outer skin 30 is lined with a thin layer of the material from which the film 40 is to be made. When the outer skin 30 is formed within the mould, the thin layer of material lining the mould becomes attached to the outer skin and forms the film 40. Colour may be alternatively provided on the exterior surface of the outer skin 30 by applying paint once the outer skin 30 has been formed and removed from the mould.

The mould used to form the inner skin 28 is designed so as to provide the base panel 2 with integrally moulded interior cabin features, such as seats or parts of seats 41,43. The mould is also designed so as to provide the base panel 2 with channels 38 in which bracing members 36 are located. The bracing members 36 are made from extruded aluminium, or any other suitable material, and located within the channels 38 before the inner skin 28 and the outer skin 30 are joined.

The inner skin 28 and the outer skin 30 are joined to form a seal 32 through the use of plastic welding techniques, adhesives or other suitable attachment means. A reinforcement filling 34 is then introduced in a foamed or liquid state into a cavity 33 bounded by the inner skin 28 and the outer skin 30. The reinforcement filling 34 is introduced into the cavity 33 via small holes provided in the inner skin 28 or the outer skin 30, or via gaps in the seal 32. Once located within the cavity 33, the reinforcement filling 34 is allowed to solidify. Alternatively, the reinforcement filling may be pre-formed using injection moulding techniques or other suitable means, and located as a

solid material prior to the joining of the inner skin 28 and the outer skin 30. Other techniques of providing the reinforcement filling 34 may be used as appropriate. The reinforcement filling may be made from polyurethane or any other suitable material. Where a panel is manufactured with more than one cavity, it is not necessary to fill each cavity with reinforcement means. Whether a cavity is filled with such means will depend upon the design requirements of the panel. The body panels 4 to 12 are manufactured in a similar manner to the base panel 2 with the step of introducing a bracing member being omitted as appropriate.

The body panels 4,6 may alternatively be manufactured as integral parts of the base panel 2. The transparent panels 14 to 24 are made from glass or any other suitable material and are manufactured using conventional techniques for the production of motor vehicle windows.

The body panels 4 to 12 are then attached to the base panel 2 by plastic welding techniques, adhesives or other suitable means. Other major components of the motor vehicle 26, such as an engine 27, are also mounted on the base panel 2. The transparent panels 14 to 24 are attached to their respective body panels through the use of adhesives or other suitable means. Interior fittings such as seat cushions, steering wheels, etc will be added as appropriate.

The light units 70,72 are manufactured in a similar manner to conventional motor vehicle light units; however, means for preventing the ingress of water need not be provided. Furthermore, the light units 70,72 may be manufactured with their own power supplies and switching mechanisms so that they may be operated when removed and isolated from the motor vehicle 26. The motor vehicle 26 is constructed so that the

light units 70,72 are mounted within the interior of the body shell and arranged so as to abut the transparent panels 14,24 respectively. Alternatively, the lighting units 70,72 may be mounted spaced from their respective transparent panels 14,24. The mounting of the light units 70,72 is such that the light emitted by them provides illumination external to the motor vehicle 26.

The present invention is not limited to the specific embodiment or method described above. Alternative arrangements and suitable materials will be apparent to a reader skilled in the art.

CLAIMS

1. A motor vehicle comprising a base panel made from a least one type of plastics material.
2. A motor vehicle as claimed in claim 1, wherein the base panel further comprises at least one bracing member for providing additional strength to the base panel.
3. A motor vehicle as claimed in any one of the preceding claims, wherein the motor vehicle further comprises at least one body panel made from at least one type of plastics material.
4. A motor vehicle as claimed in claim 3, wherein the base panel and/or the or each body panel further comprises a film provided on the exterior surface of the respective panel to provide colour and/or texture thereto.
5. A motor vehicle as claimed in claim 4, wherein the base panel and/or the or each body panel further comprises a film provided on the interior surface of the respective panel to provide colour and/or texture thereto.
6. A motor vehicle as claimed in any one of the preceding claims, wherein at least one base panel or body panel comprises an inner plastic skin and an outer plastic skin.

7. A motor vehicle as claimed in any one of the preceding claims, wherein at least one base panel or body panel comprises at least one enclosed cavity provided between the interior and exterior surfaces thereof.
8. A motor vehicle as claimed in claim 7, wherein the or each cavity is filled with a solid or foamed material.
9. A motor vehicle as claimed in any one of the preceding claims, wherein the base panel provides at least one integrally moulded interior cabin feature.
10. A motor vehicle as claimed in any one of the preceding claims, wherein transparent panels made from at least one type of plastics material define part of a body shell.
11. A motor vehicle as claimed in any one of the preceding claims, wherein a single body panel forms the roof and walls of the body shell.
12. A motor vehicle as claimed in any one of the preceding claims, further comprising a steering wheel assembly adjustable between at least two lockable positions in a direction parallel to the longitudinal axis of the motor vehicle.

13. A motor vehicle as claimed in claim 12, further comprising a foot pedal assembly adjustable between at least two lockable positions in a direction parallel to the longitudinal axis of the motor vehicle.
14. A motor vehicle comprising a body shell incorporating front and rear windows, wherein a plurality of light units are mounted within the interior of the body shell adjacent or spaced from the front and rear windows such that light emitted by the light units provides illumination external to the motor vehicle.
15. A motor vehicle as claimed in claim 14, wherein the light units are mounted on or within a dashboard and/or rear parcel shelf of the motor vehicle.
16. A motor vehicle as claimed in claim 14 or 15, wherein the light units are self contained and operable in isolation from the motor vehicle.
17. A motor vehicle as claimed in any one of claims 14 to 16, wherein the light units are adjustable and removable from within the interior of the body shell.
18. A motor vehicle comprising a body shell incorporating a plurality of body panels, wherein at least one airbag is mounted in a stored position within the body shell with means provided for deploying the or each airbag into an inflated position extending beyond the exterior surface of the body shell.

19. A motor vehicle as claimed in claim 18, wherein means are provided for anticipating an impending impact of the exterior surface of the body shell with an extrinsic object.

20. A motor vehicle as claimed in claim 19, wherein the means for anticipating an impending impact incorporate means for sensing the distance between the motor vehicle and the extrinsic object and means for sensing the velocity of the motor vehicle relative to the extrinsic object.

21. A motor vehicle as claimed in claim 19 or 20, wherein the means for anticipating an impending impact include initiating means for the deployment of the or each airbag into the inflated position.

22. A motor vehicle as claimed in any one of claims 18 to 21, wherein a source of gas is provided for inflating the or each airbag.

23. A motor vehicle as claimed in claim 22, wherein the source of gas comprises a container of compressed air.

24. A motor vehicle as claimed in claim 22, wherein the source of gas comprises means for generating an explosive chemical reaction having at least one gaseous product.

25. A motor vehicle as claimed in any one of claims 22 to 24, wherein means are provided for introducing additional gas into the or each airbag once the or each airbag is deployed into the inflated position.

26. A motor vehicle as claimed in any one of claims 22 to 25, wherein means are provided for allowing a controlled escape of gas from the or each airbag.

27. A motor vehicle as claimed in any one of claims 18 to 26, wherein the or each airbag is independently operable.

28. A motor vehicle as claimed in any one of claims 18 to 27, wherein at least one airbag is arranged to deploy in front of the motor vehicle.

29. A motor vehicle as claimed in any one of claims 18 to 28, further comprising the features of the motor vehicle claimed in any one of claims 1 to 17.

30. A motor vehicle substantially as hereinbefore described with reference to the accompanying drawings.

31. A method of manufacturing a motor vehicle comprising the steps of forming a base panel from plastics material, forming at least one body panel from plastics material and joining the base panel and the or each body panel to form a body shell.

32. A method as claimed in claim 31, wherein the base panel and the or each body panel are formed by injection moulding.
33. A method as claimed in claim 31 or 32, comprising the step of applying a film of plastics material to the exterior surface of the base panel and/or the or each body panel.
34. A method as claimed in any one of claims 31 to 33, wherein the forming of the base panel and the or each body panel comprises the steps of forming an inner plastic skin and forming an outer plastic skin, the inner and outer plastic skins being formed separately from one another.
35. A method as claimed in claim 34, wherein the forming of the base panel further comprises the step of joining the inner and outer plastic skins together about at least on bracing member.
36. A method as claimed in claim 34 or 35, wherein the forming of the or each body panel further comprises the step of joining the inner and outer plastic skins together about at least one bracing member.
37. A method as claimed in any one of claims 34 to 36, wherein the inner plastic skin and the outer plastic skin of the base panel and/or the or each body panel are joined so as to provide at least one cavity therebetween.

38. A method as claimed in claim 37, wherein the forming of the base panel and/or the or each body panel further comprises the step of filling the or each cavity with a reinforcement filling.

39. A method of manufacturing a motor vehicle comprising the step of mounting a plurality of light units within the interior of a body shell adjacent or spaced from front and rear windows such that light emitted by the light units provides illumination external to the motor vehicle.

40. A method of manufacturing a motor vehicle substantially as hereinbefore described with reference to the accompanying drawings.



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Application No: GB 9607477.8
Claims searched: 1 to 13

Examiner: Robert Crowshaw
Date of search: 5 June 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): B7B (BCHA, BCM)

Int Cl (Ed.6): B62D 29/00, 29/04

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2196584 A (WARDILL) See especially page 3 lines 108-114, and the base frame in figure 20.	1, 2, 3
X	GB 2088792 A (SUZUKI) See especially the moulded synthetic resin lower body portion 1 in figure 1.	1, 2, 3
X	EP 0142581 A1 (BONFILIO) See especially the plastics material floor tray 12 in figure 2.	1, 3, 11
X	US 3596979 (V.W.) See especially the plastics material chassis in column 1 lines 18-23, and figure 4.	1, 2, 3, 7, 8, 11
X	US 2814524 (PORSCHÉ) See especially column 2 lines 18-24 and lines 33-37, and the synthetic material bottom wall 2 in figure 2.	1, 2, 3, 6, 7, 8, 9

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.



Application No: GB 9607477.8
Claims searched: 18 to 30

Examiner: Robert Crowshaw
Date of search: 26 September 1996

Patents Act 1977
Further Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.O): B7B (BSB)

Int CI (Ed.6): B60R 19/20, 21/16, 21/20, 21/22, 21/32, 21/34

Other: Online database: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 1371145 (RENAULT) See especially page 1 lines 65 to page 2 line 7, and figure 1.	18, 19, 21 22, 23, 24 26, 28
X	US 4930823 (RIVERA) See especially column 5 lines 9-18, and figure 6.	18, 22, 23 28
X	US 3708194 (AMIT) See especially the abstract and figure 3.	18, 22, 23 28
A	GB 1332025 (PEDRICK) See especially page 4 lines 32-42 and lines 53-63, and figures 6 and 8.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

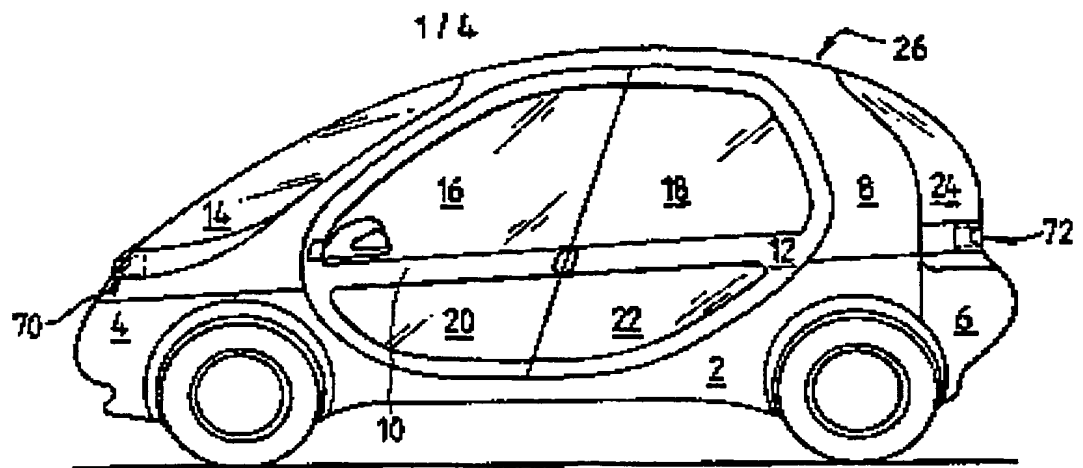


FIG. 1

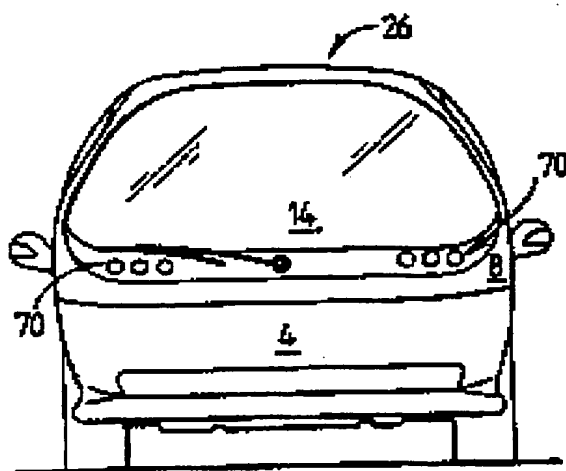


FIG. 2

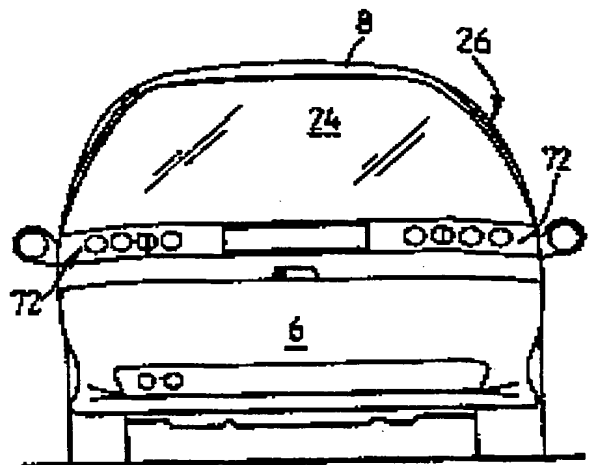


FIG. 3

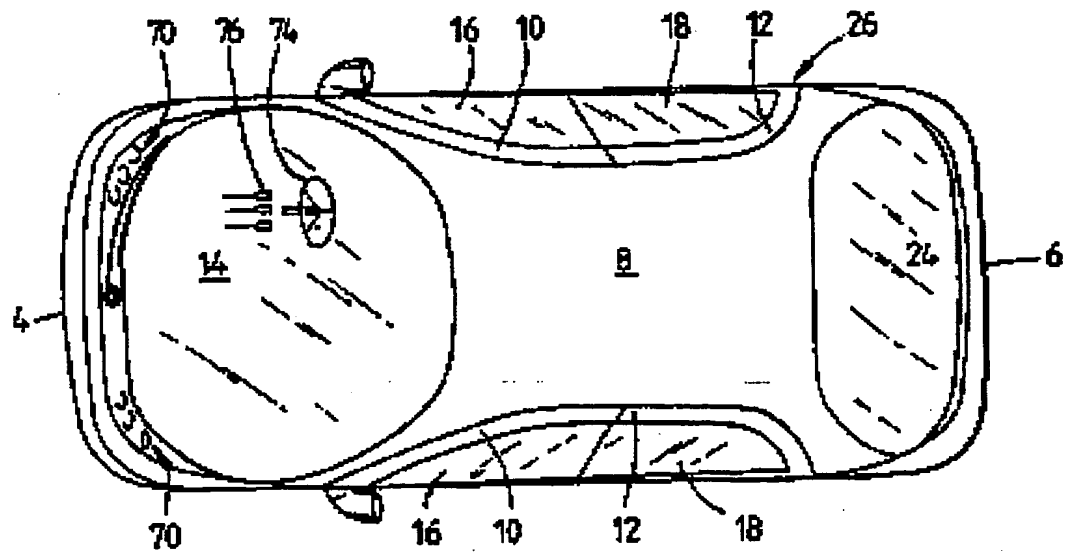


FIG. 4

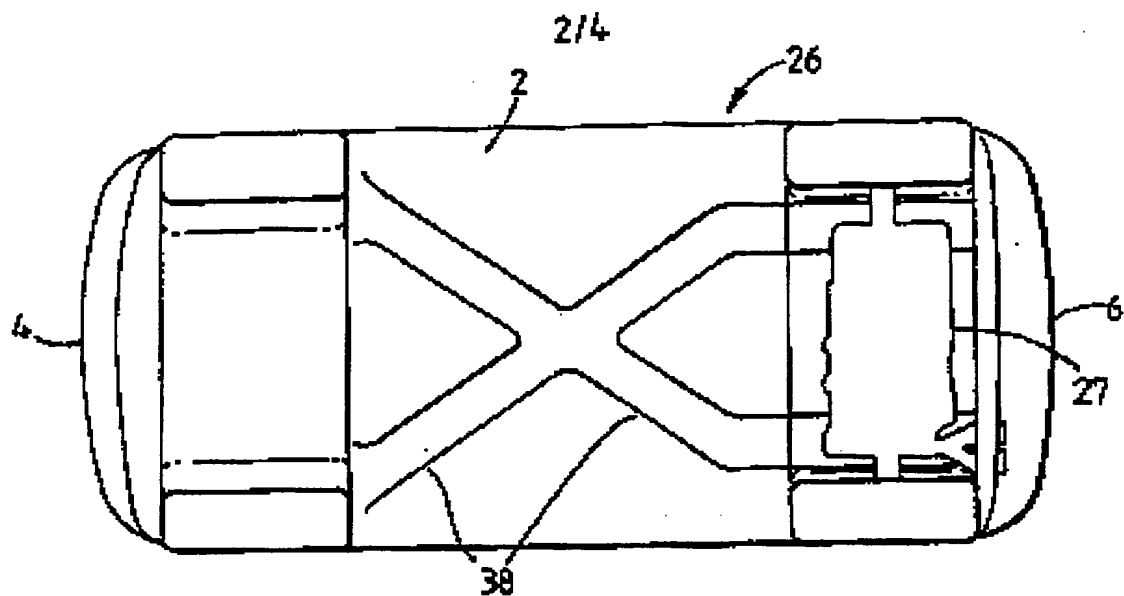


FIG. 5

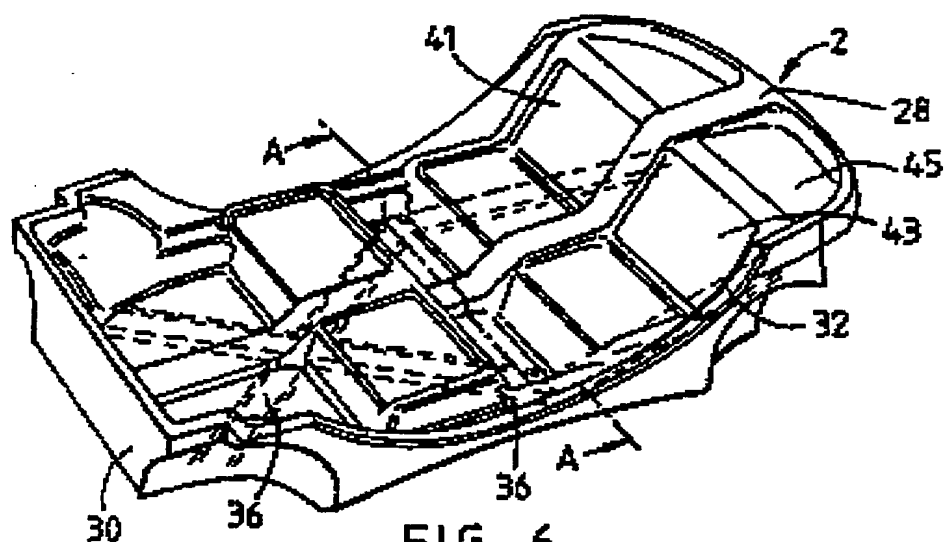


FIG. 6

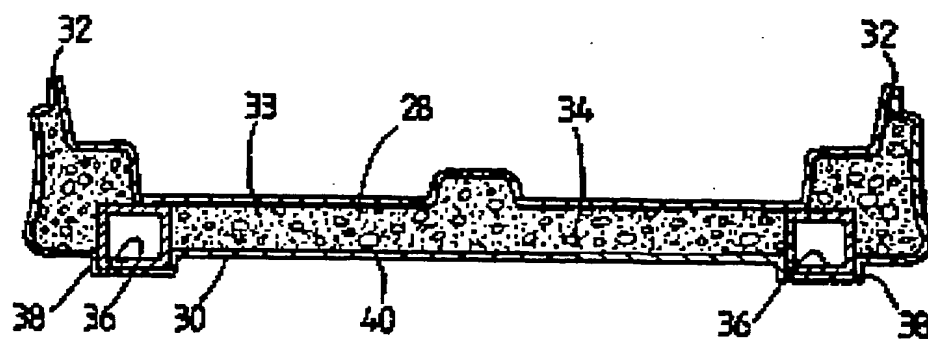


FIG. 7

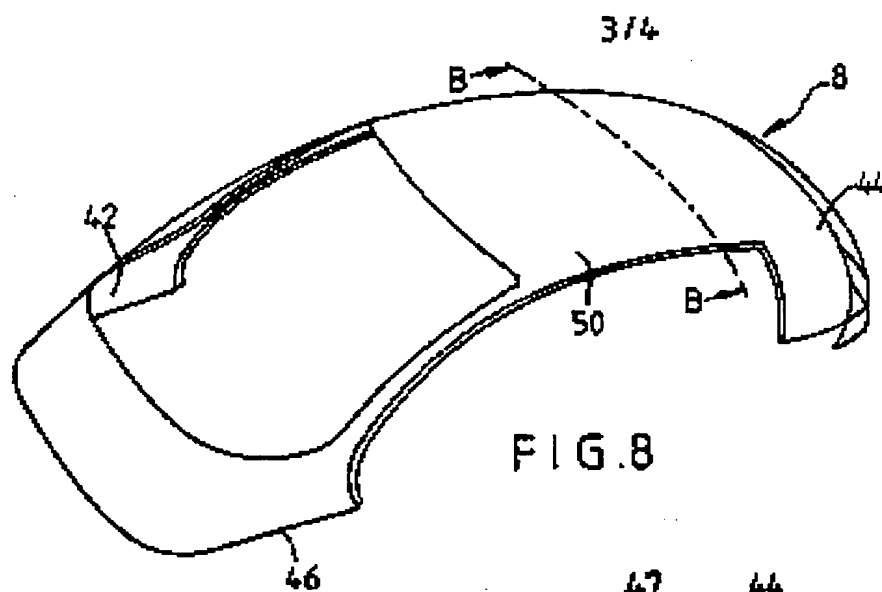


FIG. 8

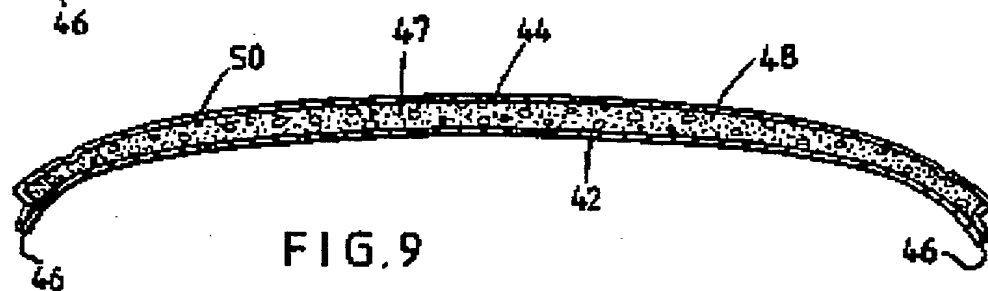


FIG. 9

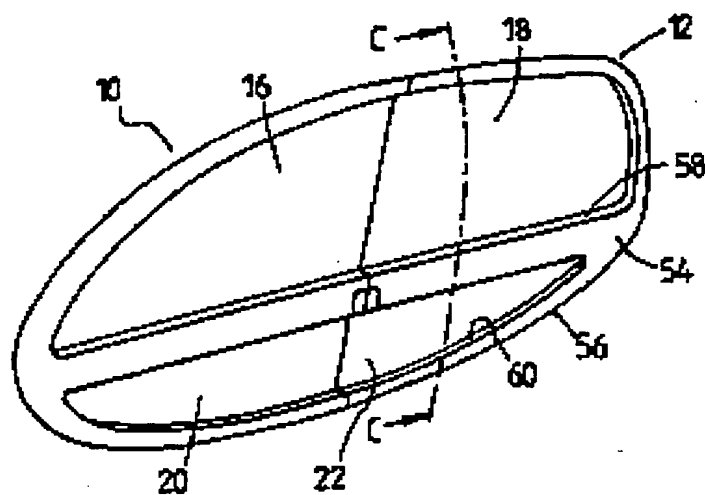


FIG. 10

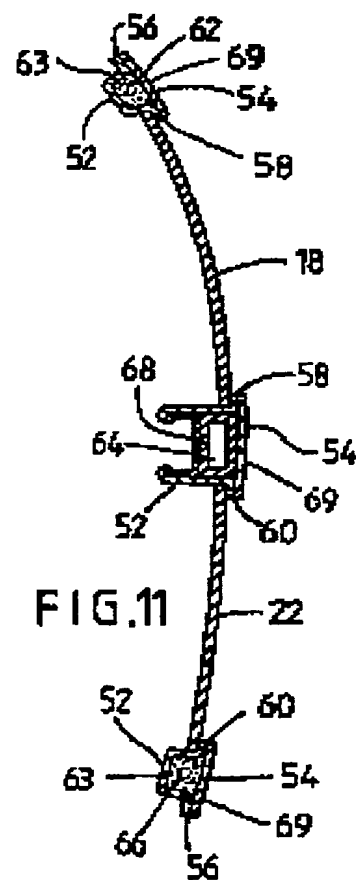


FIG. 11

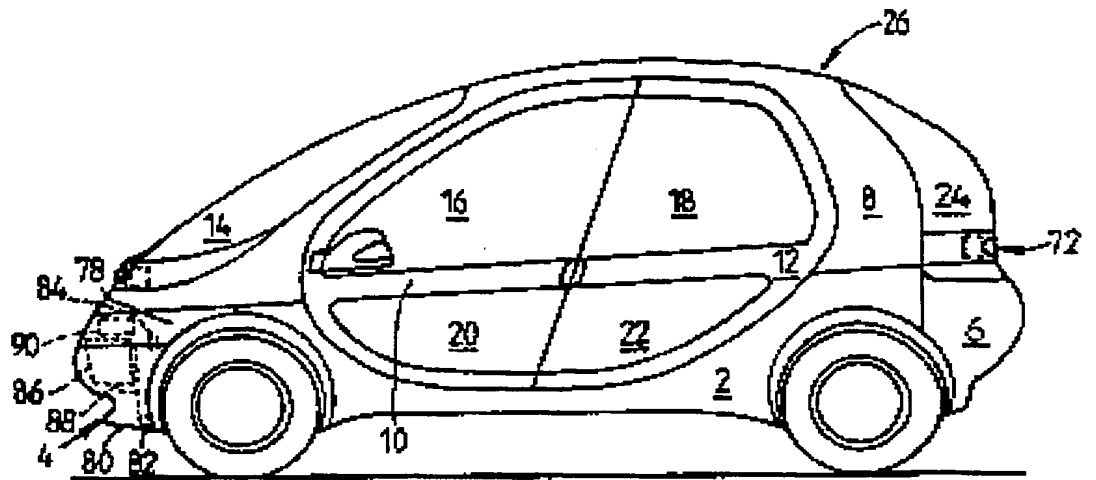


FIG. 12

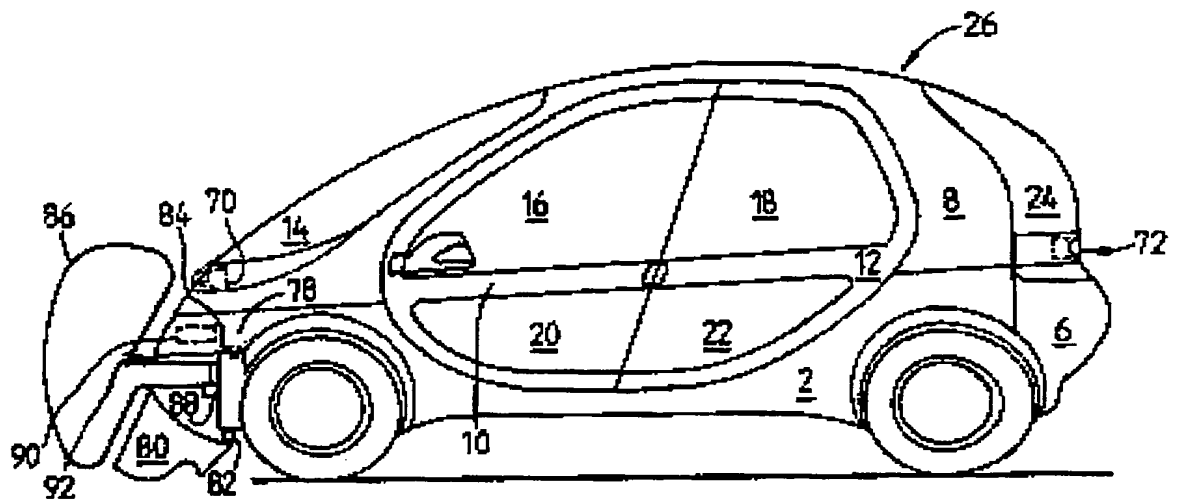


FIG. 13